

WHAT IS CLAIMED IS:

1. An image processing apparatus for outputting image data for displaying a desired 3D-shape composed of a plurality of polygons, comprising:

storage means for storing vector data defining a
5 regular polyhedron which has a centroid at an arbitrary point in
a space and each of whose faces is divided into a plurality of
polygons and representing directions from the centroid toward
vertices of the plurality of polygons, and for storing distance
data for setting distances between the centroid and the vertices
10 of the plurality of polygons of the desired 3D-shape,

reading means for reading the vector data and the
distance data from the storage means, and

image data outputting means for outputting image data
for displaying an image of the desired 3D-shape such that the
15 vertices of the plurality of polygons of the desired 3D-shape are
points which are, from the centroid, at distances based on the
distance data and in directions based on the vector data read from
the reading means.

2. The image processing apparatus according to claim 1,
wherein the plurality of polygons into which each face
of the regular polyhedron is divided have the same size and shape.

3. The image processing apparatus according to claim 1,
wherein the regular polyhedron is a regular octahedron.

4. The image processing apparatus according to claim 1,
further comprising contact determination means for
making, based on a distance of another object from the centroid
and a distance from the centroid of a polygon to be subjected to
5 contact processing on the desired 3D-shape, a contact
determination between the desired 3D-shape and the other object.

5. A program to be executed by a computer which is, for
outputting image data for displaying a desired 3D-shape composed
of a plurality of polygons, capable of reading data from storage
means for storing vector data defining a regular polyhedron which
5 has a centroid at an arbitrary point in a space and each of whose
faces is divided into a plurality of polygons and representing
directions from the centroid toward vertices of the plurality of
polygons, and for storing distance data for setting distances
between the centroid and the vertices of the plurality of polygons
10 of the desired 3D-shape, comprising:

a step of reading the vector data and the distance data
from the storage means, and

a step of outputting image data for displaying an image
of the desired 3D-shape such that the vertices of the plurality
15 of polygons of the desired 3D-shape are points which are, from

the centroid, at distances based on the distance data read and in directions based on the vector data read.

6. The program according to claim 5,

wherein the plurality of polygons into which each face of the regular polyhedron is divided have the same size and shape.

7. The program according to claim 5,

wherein the regular polyhedron is a regular octahedron.

8. The program according to claim 5,

further comprising a step of making, based on a distance of another object from the centroid and a distance from the centroid of a polygon to be subjected to contact processing on
5 the desired 3D-shape, a contact determination between the desired 3D-shape and the other object.

9. The program according to claim 8,

wherein the step of making a contact determination comprises:

a step of selecting, based on signs of space
5 coordinate values of the other object, a face area of the regular polyhedron which includes a polygon to be subjected to contact processing,

a step of identifying the polygon to be subjected

to contact processing from within the selected face area, by using
10 a plane equation obtained from the distance data, and

a step of determining contact between the other
object and the desired 3D-shape by comparing a distance of the
identified polygon from the centroid and a distance of the other
object from the centroid.

10. A recording medium for recording a program to be
executed by a computer for displaying a desired 3D-shape composed
of a plurality of polygons, and data, wherein the recording medium
has recorded thereon:

5 vector data defining a regular polyhedron which has a
centroid at an arbitrary point in a space and each of whose faces
is divided into a plurality of polygons and representing
directions from the centroid toward vertices of the plurality of
polygons,

10 distance data for setting distances between the
centroid and the vertices of the plurality of polygons of the
desired 3D-shape,

a program for reading the vector data and the distance
data from the storage means, and

15 a program for outputting image data for displaying an
image of the desired 3D-shape such that the vertices of the
plurality of polygons of the desired 3D-shape are points which
are, from the centroid, at distances based on the distance data

